CLAIMS:

1. A method for use in non-invasive measurements in a patient's body, the method comprising:

(a) creating a condition of artificial blood kinetics at a measurement location in a patient's blood perfused fleshy medium and maintaining this condition for a certain time period;

(b) applying an external electromagnetic field to the measurement location while under said condition of artificial blood kinetics;

(c) detecting a time response of the medium from at least a portion of the measurement location to said external electromagnetic field, and generating measured data indicative of time evolutions of the response of the medium over at least a part of said certain time period;

the response to said external electromagnetic field including at least one of the following: an acoustic response to illuminating incident light having a wavelength in a range where the scattering properties of blood are sensitive to light, and an impedance of the portion of the medium.

2. The method of Claim 1 comprising:

analyzing said measured data for determining at least one characteristic parameter derived from said time response of the medium;

providing predetermined reference data d indicative of a desired blood characteristic obtained by other independent method as a function of said characteristic parameter; and

utilizing the determined characteristic parameter derived from said time response of the medium and said predetermined reference data for obtaining a value of the desired blood characteristic of the patient.

3. The method of Claim 1 comprising altering said condition of artificial blood kinetics at the measurement location over a predetermined time interval within said certain time period so as to modulate properties of the blood affecting said time response.

4. The method of Claim 3 comprising:

analyzing said measured data for determining at least one characteristic parameter derived from said response of the medium;

providing predetermined reference data indicative of a desired blood characteristic obtained by another independent method as a function of said characteristic parameter; and

utilizing the determined characteristic parameter derived from said response of the medium and said predetermined reference data for obtaining a value of the desired blood characteristic of the patient.

5. The method of Claim 2 wherein said reference data is a calibration curve defining a dependence of the characteristic parameter on the desired blood characteristic.

6. The method of Claim 4 wherein said reference data is a calibration curve defining a dependence of the parameter on the desired blood characteristic.

7. The method of Claim 2 wherein said at least one characteristic parameter is an actual value of the time response at a certain moment during said certain time period.

8. The method of Claim 7 wherein said certain moment is chosen when the response attains its near asymptotic magnitude.

9. The method of Claim 4 wherein said at least one characteristic parameter is an actual value of the time response at a certain moment during said certain time period.

10. The method of Claim 9 wherein said certain moment is chosen when the response attains its near asymptotic magnitude.

11. The method of Claim 2 wherein said characteristic parameter is a parametric slope defined as a ratio between a first function depending on the time response of the medium corresponding to a first frequency of the external electromagnetic field and a second function depending on the time response of the medium corresponding to a second frequency.

12. The method of Claim 4 wherein said characteristic parameter is a parametric slope defined as a ratio between a first function depending on the time response of the medium corresponding to a first frequency of the external electromagnetic field and a second function depending on the time response of the medium corresponding to a second frequency.

13. The method of Claim 11 wherein said first and second functions are logarithmic functions of the response corresponding to the first and second frequencies, respectively.

14. The method of Claim 12 wherein said first and second functions are logarithmic functions of the response corresponding to the first and second frequencies, respectively.

15. The method of Claim 11 wherein said first and second functions are a time rate of the changes of the response corresponding to the first and second frequencies, respectively.

16. The method of Claim 12 wherein said first and second functions are a time rate of the changes of the response corresponding to the first and second frequencies, respectively.

17. The method of Claim 1 wherein said creating of the condition of artificial blood kinetics comprises applying primary over-systolic pressure to the medium with a normal blood flow to create a state of temporary blood flow cessation in the medium at the measurement location.

18. The method of Claim 17, wherein said creating of the state of temporary blood flow cessation at the measurement location comprises applying the primary over-systolic pressure to the medium at a certain location upstream of the measurement location.

19. The method of Claim 1 wherein said certain time period is insufficient for irreversible changes in the fleshy medium.

20. The method of Claim 3 wherein said altering of the condition of artificial blood kinetics includes applying a perturbation to the medium by at least one

secondary pressure pulse of a predetermined value over said predetermined time interval.

21. The method of Claim 20 wherein the predetermined value of the secondary pressure is in the range of about 0-300 mmHg.

22. The method of Claim 3 wherein said altering of the condition of artificial blood kinetics includes applying a perturbation to the medium by secondary pressure of a predetermined cyclic pattern over said predetermined time interval.

23. The method of Claim 22 wherein said predetermined cyclic pattern is in the form of secondary pressure pulses having amplitudes in the range of about 0-300 mmHg.

24. The method of Claim 17, comprising altering said condition of artificial blood kinetics at the measurement location over a predetermined time interval within said certain time period so as to modulate properties of the blood affecting said time response.

25. The method of Claim 24 wherein said altering of the condition of artificial blood kinetics includes applying a perturbation to the medium by at least one secondary pressure pulse of a predetermined value over said predetermined time interval.

26. The method of Claim 25 wherein the predetermined value of the secondary pressure is in the range of about 0-300 mmHg.

27. The method of Claim 24 wherein said altering of the condition of artificial blood kinetics includes applying a perturbation to the medium by secondary pressure of a predetermined cyclic pattern over said predetermined time interval.

28. The method of Claim 27 wherein said predetermined cyclic pattern is in the form of secondary pressure pulses having amplitudes in the range of about 0-300 mmHg.

29. The method of Claim 1 wherein at least one desired characteristic of the patient's blood to be measured is a concentration of glucose therein.

30. A system for use in non-invasive measurements in a patient's body for determining at least one desired characteristic of the patient's body, the system comprising:

(i) a pressurizing assembly configured to be applied to the patient's body and operable for creating a condition of artificial blood kinetics at a measurement location in a patient's blood perfused fleshy medium and maintaining this condition for a certain time period;

(ii) a measuring probe including

a source of an external electromagnetic field configured and operable for applying the electromagnetic field to the measurement location, and

a detecting module configured for detecting a response of the medium from at least a portion of the measurement location to said external electromagnetic field, and generating measured data indicative of the response as a function of time; and

(iii) a control unit connectable to said pressurizing assembly and measuring probe, said control unit comprising a memory for storing reference data indicative of the desired blood characteristic as a function of a characteristic parameter derived from the time response; and a data acquisition and processing utility configured to be response to the measured data and to analyze the measured data utilizing the reference data to determine said at least one desired blood characteristic.

31. The system of Claim 30 wherein said pressurizing assembly comprises a primary occlusion cuff for applying a primary over-systolic pressure to the fleshy medium at a primary pressure location.

32. The system of Claim 31 wherein said pressurizing assembly comprises a secondary occlusion cuff for applying a secondary pressure to the fleshy medium at a secondary pressure location, thereby altering said condition of the artificial blood kinetics at said secondary pressure location over a predetermined time interval within said certain time period so as to modulate properties of the blood affecting said time response.

33. The system of Claim 32 wherein said primary pressure location is selected upstream of the secondary pressure location with respect to the normal blood flow direction in the medium, said secondary pressure location being in the vicinity of the measurement location.

34. The system of Claim 30 wherein said measuring probe includes a photo-acoustic system, where said source of the external electromagnetic field is configured for generating light in the wavelength range where the scattering or absorbing properties of the patients blood are sensitive to provide an acoustic response, and where said detecting module is an acoustic detector.

35. The system of Claim 30 wherein said measurement probe includes a photo-acoustic system and an optical system, where said detecting module includes an acoustic radiation receiver and an optical detector.

36. The system of Claim 30 wherein said measuring probe includes a system for measuring impedance of at least a portion of the medium at the measurement location.

37. The system of Claim 30 wherein said reference data comprises a calibration curve defining a dependence of the characteristic parameter on the desired blood characteristic.

38. The system of Claim 37 wherein said at least one characteristic parameter is an actual value of the time response at a certain moment during said certain time period.

39. The system of Claim 38 wherein said certain moment is chosen when the response attains its near asymptotic magnitude.

40. The system of Claim 30 wherein said characteristic parameter is a parametric slope defined as a ratio between a first function depending on the time response of the medium corresponding to a first frequency of the external electromagnetic field and a second function depending on the time response of the medium corresponding to a second frequency.

41. The system of Claim 40 wherein said first and second functions are logarithmic functions of the response corresponding to the first and second frequencies, respectively.

42. The system of Claim 40 wherein said first and second functions are a time rate of the changes of the response corresponding to the first and second frequencies, respectively.

43. The system of Claim 30 wherein said at least one desired characteristic of the patient's blood is a concentration of glucose therein.